

evident manner by conforming Fig. 3B to the Written Description. Support for this amendment is found in paragraph 64 of the Written Description, and the undersigned believes that this amendment does not add new matter.

Claims 5, 9, 14, 17-19, 23, and 27 are amended. Claim 5 is amended to more particularly describe the invention. Support for this amendment is found in paragraph 33 of the Written Description. Claim 9 is amended to delete a second period at the end of the claim. Claim 14 is amended to improve antecedent basis. Claims 17-19 are amended to improve antecedent basis and to more particularly point out the invention. Claim 23 is amended to more particularly describe the invention. Claim 27 has been amended for consistency with claim 21 and amended Fig. 3B. The undersigned believes these amendments do not add new matter.

Rejections under 35 U.S.C. § 102(b)

Claims 1, 4-6, 8, and 9 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,408,084 by Brandorff et al. (hereinafter "Brandorff"). The Examiner cites Brandorff for disclosing a two-dimensional bar code reader that includes a CCD camera assembly, a shroud that blocks ambient light from entering the imaging camera and an illumination assembly of LEDs for uniformly illuminating the target area. The Applicants respectfully traverse the Examiner's rejections of these claims.

Claim 1 recites, among other elements, that the illumination lamp is disposed within the shroud to illuminate the computer-readable code at an angle such that light from the illumination lamp is not directly reflected from the surface of the imaging area. (Paragraph 33 of the Written Description). The shroud not only blocks ambient light, but also aligns the camera and illumination lamp relative to a surface being scanned (Paragraph 35 of the Written Description). Thus, the lamp and shroud work in conjunction so that bright light from the illumination lamp is not directly reflected into the camera.

Brandorff discloses a two-dimensional array of LEDs for providing uniform illumination to a surface being imaged. The LEDs are mounted on a board with a center

opening for the imaging camera, and flash as the camera is triggered. Col. 2, lines 60-63; Col. 3, lines 25-46. However, light from the LED array can be directly reflected into the camera and cause "hot spots". To avoid such hot spots, Brandorff discloses that polarizing the light from the illumination source, and then filtering the reflected light with a cross polarizer can eliminate "glare caused by specular light reflecting off the target surface." Col. 5, lines 38-39. While Brandorff recognizes that specular reflection/glare can be a problem when scanning images, it discloses a completely different and more complex technique for dealing with it. Therefore, Brandorff does not teach or suggest claim 1.

Accordingly, the Applicants believe claim 1 and all claims that depend from claim 1 are allowable. Reconsideration of claim 1 and removal of its rejection is respectfully requested.

Claim 4, which depends from claim 1, recites an optical filter disposed between the imaging camera and the surface, the optical filter transmitting relatively more blue and red light than green light into the imaging camera. As discussed in paragraph 37 of the Written Description, some detectors (camera) are more sensitive to green light. Thus, an optical filter transmitting relative more blue and red light can color-balance the image.

The Examiner cites Brandorff for disclosing a narrow bandpass filter between the camera and the surface. Brandorff states that such a "filter allows only light in a selected region of the spectrum in which the LEDs emit to reach the CCD imaging elements, thereby eliminating the image distorting effects of radiated light in the infrared region of the spectrum and of ambient illumination." Col. 5, lines 30-34. Green light is between blue and red in the optical spectrum, and narrow bandpass filters do not generally transmit opposite ends of the spectrum. Thus the narrow bandpass filter disclosed in Brandorff is not equivalent to or suggestive of the optical filter recited in claim 4, and claim 4 is further allowable.

Claim 6, recites that the imaging camera is disposed a distance  $d$  from the surface and has a camera imaging area with an image width of  $2s$ , the imaging area having a first edge and an opposite edge, wherein the illumination lamp is disposed beyond, relative to the imaging camera, a limit line extending from the first edge or the opposite edge at an

angle from normal to the surface, the angle being greater than the inverse tangent of  $s/2d$ . As illustrated in Fig. 1B and discussed in the associated Written Description, this configuration avoids specular reflections into the camera from the lamp off the surface. The Examiner cites Brandorff for disclosing that the imaging camera is disposed inside the apparatus at an unspecified fixed distance above the target surface. The Applicants respectfully traverse the Examiner's rejection of claim 6 on the basis that the imaging camera is at a fixed distance above the target surface.

As discussed above in support of claim 1, above, the device of Brandorff uses cross polarizers to avoid specular reflections from the target surface. Therefore, the relationship between the image, illumination lamp, and camera recited in claim 6 is not disclosed or suggested in Brandorff, and claim 6 is further allowable.

Claim 9 is allowable for at least the reasons given in support of claims 1 and 6.

Claims 10-14 and 23-26 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,062,475 by Feng (hereinafter "Feng"). The Examiner cites Feng for disclosing an optical scanning device capable of reading bar code providing a scanner with a color two-dimensional photosensor array and illumination. The Applicants respectfully traverse the Examiner's position. As a threshold issue, it is noted that claims 10-14 and 23-26 are method claims, and mere recitation of an apparatus does not necessarily anticipate a method claim. MPEP 2112.02, 2114.

Claim 10 recites, among other steps, steps of providing an illumination lamp in the off condition, then of measuring light from an electronic display, and turning on the illumination lamp if the measured light is below a selected threshold. As discussed in paragraph 8 of the Background, electronic display screens may be divided into two classes, reflective and emissive. Conventional laser barcode scanners do not work well with emissive display screens because the emissive displays do not necessarily change their surface reflectivity with image content. The Written Description teaches a method of determining whether a display screen is emissive, and providing illumination if it is not. Leaving the illumination lamp off improves the first scan rate by not degrading the contrast of the displayed barcode. See paragraph 62, Written Description.

Feng does not recognize the problems associated with reading barcodes off of electronic displays, and does not disclose methods to overcome these problems. Therefore, the Applicants believe claim 10 and all claims that depend from claim 10 are allowable. If claim 10 is not allowable, the Applicants respectfully request that the Examiner identify each of the steps recited in claim 10 in the cited reference, or provide a particular explanation of why the device disclosed in Feng necessarily performs the claimed method in its normal and usual operation.

Claim 11 recites that the photodetector of claim 10 is a photodiode, and claim 12 recites that the photodetector is an imaging camera. As used in the Written Description, “a photodiode” is separate from the imager. Paragraph 33. The doctrine of claim differentiation, particularly in light of the Written Description, indicates that the element recited in claim 11 is different from the element recited in claim 12. However, the Examiner cites the photosensor array assembly 48 of Feng against both claims. Therefore, the Applicants believe at least claim 11 is further allowable.

Claim 13 recites that the electronic display recited in claim 10 is an emissive display. Claim 10 recites a method of scanning an image of computer-readable code *from* an electronic display. The Examiner cites Feng for disclosing that the scanned image can be displayed *on* an emissive display (*Emphasis added*). Thus, Feng does not disclose what the Examiner appears to rely upon in the rejection of claim 13. Since this element is not present in the cited art this claim is not anticipated, the Applicant respectfully requests reconsideration of claim 13 and removal of this rejection.

Claim 14, which depends from claim 10, recites, as amended, further steps including a step of evaluating an exposure level of the image of computer-readable code. As stated in the preamble of claim 10, the image of computer-readable code is scanned from an electronic display. Several problems arise when scanning barcodes or other images from an electronic display that do not arise or are not as significant when scanning a paper barcode. For example, the brightness, contrast, and/or reflectance may vary across an electronic display, as discussed in paragraphs 46-47 of the Written Description. Feng does not appreciate these problems, and does not disclose evaluating

an exposure level of an image of computer-readable code from an electronic display.

Therefore the Applicants believe claim 14 is further allowable.

Independent claim 23, as amended, recites a method of scanning an image of a barcode with non-square pixels displayed on an electronic display, including steps of determining an aspect ratio of a barcode element and scaling the a digitized image to create a scaled virtual image with scaled barcode elements having aspect ratios within preselected limits. *See also*, ¶¶ 51, 39-40, Written Description. While the Examiner cites Feng for defining transmittivity as an aspect ratio of the transmitted radiation to arriving radiation, this is not equivalent to the recited non-square pixels, and Feng describes transmissivity simply as a ratio, not an aspect ratio. Similarly, the Examiner cites Feng for scaling the digitized image; however, the portion of the Feng indicated by the Examiner appears to relate to adjusting the magnitude of the gray scale of the scanned image, and not to creating a scaled virtual image of the barcode. Therefore, the Applicants believe claim 23 is allowable because not all elements are disclosed or suggested by the reference.

Claim 24 recites a method of scanning an image of a barcode displayed on an electronic display, including steps of digitally filtering interference patterns from the digitized image. The Examiner cites Feng for capturing an image from an electronic display (Col. 25, line 28); however, Feng states that “an image of an item in the target area 44 will still be recognizable and useful to supervisory personnel viewing the image reconstructed from the captured image frame data even if there is some slight distortion of the image.” Col. 25, lines 25-29. There is no indication of scanning an image of a barcode from an electronic display, and no appreciation of the need for digitally filtering interference patterns, as discussed in paragraphs 39-40 and 55-56 of the Written Description. To the contrary, Feng says that distorted images are acceptable when viewed by a person. The Applicants respectfully maintain that the cited reference does not anticipate or suggest this claim, and that claim 24 is allowable. Reconsideration of claim 24 and removal of its rejection are respectfully requested.

Claim 25 is believed to be allowable for at least the reasons given above in support of the patentability of claims 13 and 24.

Claim 26 recited a method of scanning an image of a barcode displayed on an electronic display, including steps of evaluating the electronic display to determine if the electronic display is an emissive display. The Examiner cites the flowchart illustrated in Fig. 32 of Feng for disclosing various steps. However, Fig. 32 does not disclose scanning barcodes from an electronic display, nor evaluating whether an electronic display is emissive before scanning the displayed barcode, as discussed above in relation to claim 13. Therefore, the Applicants believe claim 26 is allowable.

Claims 15-17, 19, 20, and 22 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Roustaei (hereinafter “Roustaei”). The undersigned assumes that claim 18 is similarly rejected in light of the Examiner’s comments on page 6 of the Office action. Claim 15 recites a computer-readable medium having computer-readable instructions for performing a method including steps of measuring light from an electronic display with a photodetector and scanning a computer-readable code from the electronic display. The Examiner cites Roustaei for disclosing a scanning device with a photodetector. While the Examiner asserts that the photodetector is provided “to measure the amount of light from an electronic display/target”, the Applicants respectfully traverse the Examiner’s position because Roustaei does not state this.

Roustaei states that “[a] phototransistor or photodiode **203** may be placed in the vicinity of the detector **204** to measure the amount of light reflected from the target and seen by the detector **204** to set exposure time for optimal contrast and clarity.” Col. 6, lines 9-12. Roustaei does not mention measuring light from an electronic display. It is again respectfully noted that mere recitation of a device does not necessarily anticipate a method claim. The Applicants maintain that the method recited in claim 15 is not disclosed in Roustaei, nor does the device disclosed in Roustaei inherently perform the recited method in its usual manner of operation, and that claim 15 is allowable.

Claim 16 recites a method of scanning a barcode from an electronic display including steps of measuring a refresh period of the electronic display and setting an exposure time of the imaging scanner according to the measured refresh period. The Examiner cites Roustaei for disclosing setting an exposure time to less than 30 ms, and an exposure range of 20 ms maximum and 500 nanoseconds minimum, and a DRAM that

support four versions of refresh. However, Roustaei does not disclose measuring a refresh period of an electronic display or setting an exposure time of the imaging scanner according to the measured refresh period, as discussed in paragraphs 57-58 of the Written Description. The cited reference does not disclose or suggest the claimed subject matter. The Applicants believe that claims 16-20 are allowable, and that claim 22 is allowable for similar reasons.

#### Rejections Under 35 U.S.C. § 103

Claim 2 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Brandorff in view of Feng. The Examiner cites Feng for disclosing an optical assembly with a spectral range of 400-700 nm, and asserts that it would have been obvious to employ this range into the system of Brandorff to provide a clear image and avoid the use of a filter. The Applicants respectfully traverse the Examiner's position.

Claim 2 recites an imaging camera with a spectral response variation of less than 25% from about 400 nm to about 700 nm. The recited limitation on the variation is not indicated in the prior art; therefore, their combination can not result in the claimed invention. Furthermore, Brandorff states that a narrow bandpass filter may be employed to enhance clarity of the image because the image is illuminated with light having a particular spectral characteristic from the LED array. Col. 5, lines 30-35. Thus Brandorff has no need for a broad-band camera, and in fact teaches away from use of the recited camera. Where prior-art references require selective combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 5 U.S.P.W. 2d 1434 (C.A.F.C. 1988). The alleged motivation asserted by the Examiner, namely that this combination would be desirable to provide a clear image and avoid the use of a filter, is directly opposite to the disclosure of Brandorff. Accordingly, the Applicants believe claim 2 is further allowable.

Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Brandorff in view of Roustaei. Claim 3 recites that the imaging camera can be a photopic camera. The examiner cites Roustaei for disclosing a reference table measuring the

photopic reflectance with a meter and placement of targets in uniform illumination. The Examiner asserts that it would have been obvious to relate vision in bright light with light-adapted eye of Brandorff's teaching. However, as discussed above in relation to claim 2, Brandorff has no need of any camera other than one chosen to be responsive to the light emitted by the LED array. According to Brandorff, it appears that a photopic camera would be undesirable because it might allow infrared or ambient light to distort the scanned image. Therefore the Applicants believe claim 3 is further patentable.

Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Brandorff in view of Zheng. Claim 7 recites an angle from a limit line that the illumination lamp is beyond to the normal of the surface of the display. This relation is illustrated in Fig. 1B and discussed in the associated Written Description as being desirable to avoid direct reflections from the lamp into the camera off the surface. The Examiner cites Zheng for disclosing that the working range of the camera is related to the distance from the surface and the lens; however, this disclosure does not appear to be relevant to claim 7 because it does not relate to the placement of the illumination lamp. The combination of these references would not provide all of the features of the claim. Accordingly, the Applicants believe claim 7 is further allowable.

Independent claim 21 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Feng in view of U.S. Patent No. 5,984,185 by Tafoya (hereinafter "Tafoya"). The Examiner acknowledges that Feng fails to disclose a method of measuring the refresh period and setting the exposure time of the scanner according to the refresh period, and cites Tafoya for disclosing a CCD-based bar code scanner with a master CPU that initiates a read cycle. The Examiner asserts that it would have been obvious to generate a subroutine in the CPU to measure the refresh period.

Claim 21 recites, among other steps, measuring a refresh period of an electronic display, as discussed above in relation to claim 16. The rejection of claim 21 appears to be based on the refresh rate of a RAM, which is not equivalent, or even relevant, to the recited refresh period of the electronic display. Furthermore, the references do not disclose or suggest setting the exposure time of the scanner according to the refresh rate of an electronic display, or why one would be motivated to do so. Therefore, there is no



motivation to combine the cited references, and even if they were combined, the combination of the references would not result in the claimed invention. Accordingly, the Applicants believe claim 21 is allowable.

Independent claim 27 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Feng in view of U.S Patent No. 5,616,908 by Wiltz et al. (hereinafter "Wiltz"). The Examiner acknowledges that Feng fails to disclose a method for measuring an electronic display for flickering and determining the flickering period. The Examiner cites Wiltz for disclosing a bar-code reading device with a flickering laser scanner beam for improved visibility during bar code reading, and asserts that it would have been obvious to use a flickering system in order to avoid noticeable brightness variation. The Applicants respectfully traverse the Examiner's position.

Claim 27 recites, among other steps, evaluating an electronic display to determine if it is emissive. While the Examiner has cited Feng for disclosing an emissive display, the Applicants believe that this step is not disclosed in Feng for at least the reasons discussed above in support of the patentability of claim 13. Furthermore, neither reference relates to measuring the flicker of an electronic display, much less setting the exposure time according to the flicker (refresh) period, as discussed in support of the patentability of claim 16, above, and in paragraphs 57-59 of the Written Description. In Therefore, the Applicants believe claim 27 is allowable.

Version of Amended Text Showing the Changes Made

Paragraph [0030] is amended as shown below:

[0030]       The present invention provides a scanner for scanning computer-readable codes from an electronic display, such as two-dimensional barcodes. Scanners according to the present invention can **[incorporates] incorporate** both physical features, such alignment shrouds, illumination lamps, a high fill factor CCD camera with multiple pixel blocks for each barcode element, and a CCD camera with a wide spectral response for use with color displays. Scanning systems according to the present invention can also include a number of operating features, such as dynamically adjusting the exposure time to overcome display flicker or variations in brightness or reflectivity of the display screens, automatically re-scaling the scanning system to adapt to displays with non-square pixels, and identifying display type and configuring the scanner accordingly.

The following marked-up claims show the changes made to arrive at the substitute claims shown above:

5.       The scanner of claim 1 wherein the shroud is configured to place the scanner at a selected oblique angle relative to the surface when the scanner is held against the surface.

9.       A scanner for reading computer-readable codes, the scanner comprising:  
an imaging camera configured to produce an image of a computer-readable code from a surface;

a shroud at least partially surrounding the imaging camera and configured to exclude ambient light from entering the imaging camera when the scanner is held against the surface and to hold the imaging camera in a selected relation to the surface;

a photodiode disposed within the shroud; and

an illumination lamp disposed within the shroud beyond, relative to the imaging camera, a limit line extending from an edge of a imaging region at an angle of inverse tangent  $s/2d$  wherein  $s$  is one-half the width of the imaging region and  $d$  is the distance of the camera from the surface.[.]

14. The method of claim 10 further comprising steps, after the scanning step, of:

evaluating an exposure level of the image of computer-readable code, and, if the exposure level is outside preselected limits;

adjusting an exposure parameter of the scanner; and

scanning the image of the computer-readable code from the electronic display.

17. The method of claim 16 wherein the exposure time is at least twice the refresh period of the electronic display.

18. The method of claim 16 wherein the exposure time is at least ten times the refresh period of the electronic display.

19. The method of claim 16 wherein the exposure time is between 10-20 times the refresh period of the electronic display.

23. A method of scanning an image of a barcode with non-square pixels displayed on an electronic display [**with non-square pixels**], the method comprising:

capturing the image of the barcode displayed on the electronic display;

digitizing the image to create a digitized image;

providing the digitized image to a processor;

determining an aspect ratio of a barcode element, and, if the aspect ratio is outside of preselected limits;

scaling the digitized image to create a scaled virtual image with scaled barcode elements having aspect ratios within the preselected limits; and

decoding the scaled virtual image to obtain barcode information.

27. A method of scanning an image of a barcode displayed on an electronic display, the method comprising:

evaluating the electronic display to determine if the electronic display is an emissive display;

capturing a first image of the barcode with an imaging scanner;

evaluating an exposure level to determine if the exposure level is within preselected exposure level limits, and, if the exposure level is not within the preselected exposure level limits;

adjusting an exposure parameter of the imaging scanner;

capturing a second image of the barcode with the imaging scanner;

attempting to decode the second image to obtain barcode information, and, if the attempt to decode fails;

measuring the electronic display for flickering;

determining a [flicker] refresh period;

setting an exposure time according to the [flicker] refresh period;

capturing a third image of the barcode with the imaging scanner; and

decoding the third image to obtain barcode information.

### **Conclusion**

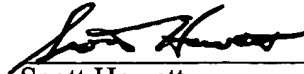
In view of the foregoing, the Applicants believe all claims pending in this Application are in condition for allowance, and that the Applicants are entitled to the claims in accordance with the Title 35 of the United States Code and Art.1, §8, cl.8 of the Constitution of the United States. The Applicant respectfully request reconsideration of all pending claims, the withdrawal of all rejections, and the issuance of a formal Notice of Allowance at an early date.

If the Examiner believes this amendment does not put all pending claims in

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condition for allowance, the undersigned invites the Examiner to telephone the undersigned at (707) 591-0789.

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